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EXAMINER	
LUU, CUONG V	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

MN

Office Action Summary	Application No.	Applicant(s)
	10/653,829	CULLICK ET AL.
	Examiner	Art Unit
	Cuong V. Luu	2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-10,12,13,15-21,23-31,42 and 44-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-10,12,13,15-21,23-31,42 and 44-48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/18/07*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claims 1, 3-10, 12-13, 15-21, 23-31, 42, and 44-48 are pending. Claims 1, 3-10, 12-13, 15-21, 23-31, 42, and 44-48 have been examined. Claims 1, 3-10, 12-13, 15-21, 23-31, 42, and 44-48 have been rejected.

Response to Arguments

1. Applicant's arguments with respect to claims 1, 3-10, 12-13, 15-21, 23-30, 42, and 44-48 have been considered but are moot in view of the new ground(s) of rejection under U.S.C. 103(a).

2. As per claim 31, Applicant's arguments with respect to claim 31 have been considered but are moot in view of the new ground(s) of rejection under U.S.C. 103(a) as being unpatentable over Landmark in view of Floris et al. (Integrated scenario and probabilistic analysis for asset decision support, Petroleum Geoscience, Vol. 8 2002, pp. 1-6, provided by the Applicant in IDS).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was

commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3-7, 9-10, 12-13, 15-21, 23-25, 27-31, 42-44, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Landmark Graphics Corporation in view of Netemeyer et al. (U.S. Pub. 2002/0169785 A1).

1. As per claim 1, Landmark teaches a method comprising:

(a) assembling a set of models that represent components of a value chain, wherein each of the models of said set includes one or more variables, where each of said one or more variables is defined on a corresponding range (p. 3, Overview section);

(b) selecting values of the variables in their respective ranges to create instantiated models (p. 4, Processing Data Using Economic Simulations section);

(c) assembling the instantiated models into a workflow (p. 4, paragraph 1. Landmark teaches of entering data and build models in the TERAS tool for simulation is interpreted as assembling the instantiated models into a workflow);

(d) executing one or more simulation engines on the workflow to generate data output (p. 3, Overview section).

(e) storing the selected values of the variables and the data output from the one or more simulation engines to a memory (p. 4, paragraph 1 and Analyzing Output with Reports and Graph section, 1st paragraph of this section);

but does not teach at least one of the models of said set of models is a geocellular reservoir model nor at least one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics.

Netemeyer teaches at least one of the models of said set of models is a geocellular reservoir model (p. 3 paragraphs 0037. This paragraph describes a method of modeling reservoir by dividing it into volumetric cells which is geocellular modeling) and at least one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics (p. 1 paragraphs 0002, 0005).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Landmark and Netemeyer. Netemeyer' s teachings would have provided been useful in simulating a reservoir system that extends the discretized reservoir simulation model beyond reservoir to include nodes and connection for modeling fluid flow in the well tubulars and surface production and gathering lines, separators and pipelines (p. 2 paragraph 0025).

2. As per claim 3, Landmark teaches repeating (b), (c) and (d) (p. 5, Options for Processing Data. Landmark teaches running evaluation, including number of iterations indicates the repeat of (b), (c) and (d)).

3. As per claim 4, Landmark teaches the method of claim 3, wherein said repeating covers all possible combinations of values of the variables in their respective ranges (p. 4, Processing Data Using Economic Simulations section. Landmark teaches using Monte Carlo simulation using probability distributions providing a range of values for modeling complex parameters. This teaching reads on the limitation recited in this claim).

4. As per claim 5, Landmark teaches the method of claim 3, wherein said repeating achieves a sensitivity analysis by scanning each variable through the corresponding range, one at a time, while maintaining all other variables at nominal values (the discussion in claim 4 inherit this analysis since simulations cover all combination of ranges which include scanning each variable through the corresponding range, one at a time, while maintaining all other variables at nominal values).

5. As per claim 6, Landmark teaches the method of claim 3, wherein said repeating uses an experimental design algorithm to generate combinations of variable values in each iteration of said repeating of (b), (c) and (d) (the Monte Carlo simulation discussed in claim 4 inherit this limitation).

6. As per claim 7, Landmark teaches said selecting of values of the variables includes computing quantiles of one or more user-specified probability distributions (p. 47, Viewing the Statistical Summary Time Series Graph section, the 1st paragraph of this section. Landmark teaches graphs showing percentiles. This implies computing quantiles of one or more user-specified probability distributions).

7. As per claim 9, Landmark teaches said selecting of values of the variables includes choosing a value in a user-specified quantile range [Q_A, Q_B] based on a probability distribution specified by a user for a first one of the variables, wherein A and B are integers between zero and 100 inclusive (p. 189, the Background on Sampled Values section. Landmark teaches using triangular probability distribution inherit these limitations as admitted by the applicants, p. 8, lines 3-13. In a probability function, values are normalized to numbers between 0 and 1 inclusive; nevertheless, to represent in percentile as discussed in claim 7, they can be values between 0 and 100 inclusive).

8. As per claim 10, these limitations have already been discussed in claim 1. They are, therefore, rejected for the same reasons.

9. As per claim 12, these limitations have already been discussed in claim 3. They are, therefore, rejected for the same reasons.

10. As per claim 13, these limitations have already been discussed in claim 1. They are, therefore, rejected for the same reasons.

11. As per claim 15, Landmark teaches the simulation engine including an economic computation engine (p. 3, Overview section, 1st paragraph of the section).

12. As per claim 16, Landmark teaches the first model is a reservoir model (p. 18, Reservoir Level Tabs section, the 1st paragraph of this section).

13. As per claim 17, Landmark teaches a system comprising:

a memory configured to store program instructions and data (p. 6, Single User and Multi-user Modes section);

a processor configured to read the program instructions from the memory, wherein, in response to execution of the program instructions (p. 6, Single User and Multi-user Modes section), the processor is operable to (the limitations below have already been discussed in claim 1; they are therefore, rejected for the same reasons):

(a) assemble a set of models, wherein each of the models of said set includes one or more variables, where each of said one or more variables is defined on a corresponding range;

(b) select values of the variables in their respective ranges to create instantiated models;

(c) assemble the instantiated models into a workflow; and

(d) execute one or more simulation engines on the workflow;

but does not teach at least one of the models of said set of models is a geocellular reservoir model nor at least one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics.

Netemeyer teaches at least one of the models of said set of models is a geocellular reservoir model (p. 3 paragraphs 0037) and at least one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics (p. 1 paragraphs 0002, 0005).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Landmark and Netemeyer. Netemeyer' s teachings would have provided been useful in simulating a reservoir system that extends the discretized reservoir simulation model beyond

reservoir to include nodes and connection for modeling fluid flow in the well tubulars and surface production and gathering lines, separators and pipelines (p. 2 paragraph 0025).

14. As per claim 18, these limitations have already been discussed in claim 1. They are, therefore, rejected for the same reasons.

15. As per claim 19, the discussions in claim 17 inherit these limitations. They are, therefore, rejected for the same reasons.

16. As per claim 20, these limitations have already been discussed in claim 1. They are, therefore, rejected for the same reasons.

17. As per claim 21, these limitations have already been discussed in claims 1 and 3. They are, therefore, rejected for the same reasons.

18. As per claim 23, Landmark teaches said capturing comprising storing the instantiated planning variables and simulation output data onto the storage medium in a relational database format (p. 6, Single User and Multi-user Modes. Landmark teaches database files being stored in an Oracle database implies simulation output data onto the storage medium in a relational database format).

19. As per claim 24, Landmark teaches said generating instantiations of the planning variables includes:

calculating a set of random numbers (p. 55, Processing Data section, 1st paragraph);

calculating quantile values using the random numbers and user-defined probability distributions associated with the planning variables (this limitation has already been discussed in claim 7).

20. As per claim 25, these limitations have already been discussed in claim 15. They are, therefore, rejected for the same reasons.

21. As per claim 27, Landmark teaches said performing setup operations including receiving user input specifying execution qualifying data corresponding to the case (p. 5, Options for Processing Data section. Landmark teaches inputting number of iterations to run reads onto this limitation).

22. As per claim 28, these limitations have already been discussed in claim 27. They are, therefore, rejected for the same reasons.

23. As per claim 29, Landmark teaches the execution qualifying data includes a set of attainable values for each planning variable (p. 3, Entering Data section).

24. As per claim 30, Landmark teaches the execution qualifying data include data characterizing probability distributions for one or more of the planning variables (p. 4, Processing Data Using Economic Simulation section).

displaying an indication of the first case, second case, and a parent child relationship between the first case and second case (p. 179 and p. 180, section Adding a project to the

evaluation. In these sections Teras teaches project hierarchy and GUI displaying hierarchical structure of projects. In addition, on page 180 Teras teaches the capability of adding a project below any project in the evaluation. The project here is regarded as a case. Therefore, this teaching is regarded as a case under another case, which is a parent-child relationship. These teachings read on this limitation according to a parent-child relationship as defined by the applicant's specification on page 43, paragraph 3 of this page and figure 13);

conditionally displaying the differences between the first case and second case in response to a user request (since these settings, as discussed in limitation "storing the first case, the second case and differences between the first case and second case in a memory medium" above, can be displayed if users access them by clicking on their tabs. It would be obvious for users to display differences between the 2 cases by clicking on the second case tab, which stores only differences, to display them. This is regarded as Teras' teaching of conditionally displaying the differences between the first case and second case in response to a user request).

25. As per claim 42, these limitations have already been discussed in claim 1. They are, therefore, rejected for the same reasons.

26. As per claim 43, these limitations have already been discussed in claim 2. They are, therefore, rejected for the same reasons.

27. As per claim 44, these limitations have already been discussed in claim 3. They are, therefore, rejected for the same reasons.

28. As per claim 46, Landmark teaches executing a schedule resolver program, which generates instantiated schedules based on a first subset of the set of models and a first subset of the instantiated values (p. 155, Building a Production Schedule section, the first 2 paragraphs).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landmark in view of Netemeyer as applied to claim 1 above, and further in view of Joshi et al (Techno—Economic and Risk Evaluation of a Thermal Recovery Project, March 1996, Prepared for Department of Energy, Under Contract DE-FG22-93BC14899)

29. As per claim 8, Landmark and Netemeyer do not teach selecting of values of the variables being based on a Latin Hypercube sampling of the variables.

Joshi et al teach this limitation (pp. xliv, paragraph 4; p. xlv, paragraph 2).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Landmark, Netemeyer, and Joshi. Joshi's teachings would accurately have re-created an input distribution in less iteration, as compared to Monte-Carlo sampling (paragraph 4; p. xlv, paragraph 2).

Claims 26 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Landmark in view of Netemeyer as applied to claims 21 and 42 above, and further in view of the applicants' admitted prior art.

30. As per claim 26, Landmark and Netemeyer do not teach the calculation loop further including executing a well perforator prior to executing the one or more simulation engines.

The applicants' admitted prior art teaches this limitation (p. 2, lines 5-10 and 20-23).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Landmark, Netemeyer, and the applicants' admitted prior art. The applicants' admitted prior art's teachings would have provided more information on establishment of the wells and facilities for planning a petroleum production (p. 2, lines 5-10 and 18-19).

31. As per claim 47, these limitations have already been discussed in claim 26. They are, therefore, rejected for the same reasons.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landmark in view of Floris et al. (Integrated scenario and probabilistic analysis for asset decision support, Petroleum Geoscience, Vol. 8 2002, pp. 1-6, provided by the Applicant in IDS).

32. As per claim 31, Landmark teaches a method comprising:

receiving user input to assemble a first case comprising models and planning variables (p. 137, Decision Trees section. Landmark teaches designing cases that approximate the mean value of a stochastic model. This is regarded as assembling a first case comprising models and planning variables);

receiving user input to assemble a second case based on the first case (p. 137, Decision Trees section. This section teaches modeling scenarios by combining or subtracting two possible outcomes for two different well unit designs. This teaching is regarded as receiving user input to assemble a second case based on the first case);

storing the first case, the second case in a memory medium ((p. 137, Decision Trees section. This section teaches modeling first and second case as discussed above, so it implies storing the first and second cases in a memory medium);

Floris teaches:

storing differences between the first and second cases in a memory medium (p. 2 Fig. 1 and col. 1 section Scenario Approach paragraph 1. This paragraph and Fig. 1 teach differences between scenarios are shown, so it is interpreted that differences between the first and second cases are stored in a memory medium);

displaying an indication of the first case, second case, and a parent child relationship between the first case and second case (p. 2 Fig. 1. This Figure shows a graph displaying parent child relationship among cases, so it reads onto this limitation);

conditionally displaying the differences between the first case and second case in response to a user request (p. 2 Fig. 1).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Landmark and Floris. Floris' teachings would have fitted well with the intuitive conceptual thinking of subsurface modelers (p. 2 col. 2 1st bullet).

Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landmark in view of Netemeyer as applied to claim 42 above, and further in view of Orteva (U.S. Pub. 2002/0013687 A1)

33. As per claim 45, Landmark and Netemeyer do not teach executing a reservoir model-scaling engine to scale one or more geocellular reservoir models of said set of models to a lower resolution.

Orteva teach this limitation (p. 27, paragraph 0427).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Landmark, Netemeyer, and Orteva. Orteva's teachings would have provided a self-consistent method for finding the most probable homogenized solution by integrating multiple scale analysis and information theory (p. 27, paragraph 0427).

Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landmark in view of Netemeyer and the applicants' admitted prior art.

34. As per claim 48, Landmark teaches a method comprising:

(a) receiving user input characterizing a set of planning variables associated with a set of models (p. 3, Overview section);

(b) generating instantiated values of the planning variables (p. 3, Overview section);

(c) assembling a first input data set using a first subset of the instantiated values and a first subset of the set of models, and assembling a second input data set using a second subset of the instantiated values and a second subset of the set of models p. 4, paragraph 1. Landmark teaches of entering data and build models in the TERAS tool for simulation is interpreted as assembling the instantiated models into a workflow. In addition, the discussions in claim 31 indicate the building or 1st and 2nd models);

(e) determining instantiated schedules using a third subset of the instantiated values and a third subset of the models, and appending the instantiated schedules to the first input data set and the second input data set (the discussions in claim 46 teaches determining instantiated schedules using a third subset of the instantiated values and a third subset of the models. In addition, on p. 3, Entering Data section, Landmark teaches entering historical

information to build a model. As a result, the instantiated schedules could be entered into the first and second input data sets as recited in this limitation);

(f) generating flow data for oil, gas and water and appending the flow data to the second input data set (p. 151, Example: Building a Typical Reservoir Model, paragraph 1 of the section; p. 198, Cross plot graphs section, Table of Category and Selection. The cited paragraph and table are regarded generating flow data for oil. In addition, the 1st paragraph of Entering Data section on page 3 cites engineering data implying that these generated data could be entered or appended to the second input data set for the next simulation);

(g) executing an economic computation engine on the second input data set to generate economic output data (this limitation has already been discussed in claim 15);

(h) storing the instantiated values of the planning variables, the flow data and the economic output data to a storage medium in a relational database format (this limitation has already been discussed in claim 2); and

(i) repeating (b), (c), (d), (e), (f), (g) and (h) until a termination condition is achieved (p. 5, Options for Processing Data. Landmark teaches running evaluation, including number of iterations indicates the repeat of (b), (c) and (d). This section is regarded as repeating of steps (b), (c), (e), (f), (g) and (h) until a termination condition is achieved).

Landmark does not teach.

(d) determining well perforation locations for wells in the first input data set, and appending the well perforation locations to the first input data set;

executing one or more physics-based flow simulators, wherein the one or more physics-based flow simulators are configured to simulate reservoirs, wells and surface-pipeline hydraulics; and

at least one of the models of said set of models is a geocellular reservoir model.

The applicants' admitted prior art teaches limitation (d) (p. 2, lines 5-10 and 20-23. In the recited lines, the reference says, "establishment of a well may involve investment to drill, perforate and complete the well". This teaching means well perforation is possible, so perforating the well is included in this teaching. The step of well perforation inherits the step of determining perforation locations for the well and appending the well perforation locations to the first input data set).

Netemeyer teaches at least one of the models of said set of models is a geocellular reservoir model (p. 3 paragraphs 0037) and at least one of the one or more simulations engines including one or more physics-based reservoir flow simulators for simulating reservoir, wells and surface-pipeline hydraulics (p. 1 paragraphs 0002, 0005).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Landmark, Netemeyer, and the AAPA. Netemeyer' s and the AAPA's teachings would have provided been useful in simulating a reservoir system that extends the discretized reservoir simulation model beyond reservoir to include nodes and connection for modeling fluid flow in the well tubulars and surface production and gathering lines, separators and pipelines (Netemeyer, p. 2 paragraph 0025) and provided more information on establishment of the wells and facilities for planning a petroleum production (the AAPA, p. 2, lines 5-10 and 18-19).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cuong V. Luu whose telephone number is 571-272-8572. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah, can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. An inquiry of a general nature or relating to the status of this application should be directed to the TC2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CVL

KAMINI SHAH
SUPERVISORY PATENT EXAMINER